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BIOLOGICAL EVALUATION OF THE SOUTHERN PINE BEETLE ON THE BANKHEAD NATIONAL FOREST IN ALABAMA

by

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INTRODUCTION

A biological evaluation was conducted on the Bankhead National Forest, Bankhead and Black Warrior Districts, the weeks of September 10 and 17, 1979. The purpose of the evaluation was to determine the current status of southern pine beetle (Dendroctonus frontalis Zimmerman) populations on the forest and to determine what action, if any, would be necessary in FY 80.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except that survey coverage was 100 percent.[2/] The survey was made by district personnel and spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. Ten SPB spots per district were selected for ground checking.

Ground check data, including numbers of vacated and infested trees were recorded. Bark samples (3.1 dm^2) for attack:emergence analysis were collected.

Attack:Emergence Evaluation

The attack:emergence analysis procedure for estimating subsequent tree mortality from SPB infestations was adapted as a predictive tool.[3/ 4/]

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2/ Detection of Forest Pests in the Southeast, 1970. USDA, Forest Service, Southeastern Area, State and Private Forestry, Publ. S&PF-7, Atlanta, Ga. 51 pp.

3/ Moore, G. E. 1977. Factors for determining trends in southern pine beetle spots. J. Environ. Entomol. Vol. 7, No. 3. pp. 335-341.

4/ This methodology is being used on a trial basis. Further analysis and evaluation must be made before further use.

This procedure predicts future spot growth based on the ratio of southern pine beetles entering the trees to the number of beetles emerging (this is both attacking adults and developed brood). For purposes of this evaluation, the procedure will be referred to as the attack:emergence ratio. A prediction of SPB increase would require an attack:emergence ratio of 1:10 or greater. Attack:emergence ratios for spots predicted to remain static in growth would be 1:5 - 1:9.9. A decreasing population would have an attack:emergence of less than or equal to 1:4.9. This procedure has been proven on a spot basis for a 2-year period in North Carolina.[5/] This evaluation assumes that spot growth as predicted by the attack:emergence bark sample analysis is indicative of SPB population growth on the forest on an area basis. For example, if attack:emergence ratios predict increased populations within the sample spots, then the assumption would be that an increased amount of volume will be lost (or an increased number of trees will be killed) by SPB area-wide on the district.

Volume Protected Determination

The volume which would be protected by having a suppression project was estimated by use of spot growth formulae. Spot growth formulae estimate the amount a spot would grow if not salvaged. The difference between salvage volume and the size the spot would have grown if left alone is the volume protected.[6/]

RESULTS

Aerial Survey and Ground Checks

One hundred and thirty-two SPB infestations were found on the Bankhead District, ranging from 25 to > 300 red and fading trees. Seventy percent of the SPB spots ground checked were found in pulpwood size stands. Ground check data and attack:emergence data are summarized in table 1.

One hundred and seventy-six SPB infestations were found on the Black Warrior District ranging from 25 to > 1,000 red and fading trees. Ground check data and attack:emergence data are summarized in table 2.

Attack:Emergence Evaluation

Attack:emergence ratios were found to indicate static-increasing SPB populations on the Bankhead District and increasing SPB populations on the Black Warrior District (A:E of 1:9.81 and 1:10.7, respectively) (see tables 1 and 2). Based on the attack:emergence procedure, FY 80 losses should range from 1 - 1.5 times the losses experienced in FY 79 for the Bankhead District. The Black Warrior District can expect losses to range from 1.5 to 3 times the damages level of FY 79.

6/ Hedden, R. L. 1979. Southern pine beetle spot growth inactivity in East Texas. Forest Sci. In press.

Table 1. Summary of ground check data and attack:emergence bark analysis data for Bankhead District, Bankhead National Forest, September 1979.

Total No. of Trees	No. Infested Trees			No. Vacated Trees	Attack:Emergence Ratio	Red:Green[1/] Ratio
	Total	Green	Reds & Faders	Total Red and Black Trees		
29	5	3	2	24	1:4.2	1:1.5
91	81	74	7	10	1:6.0	1:10.57
24	2	2	-	22	1:4.3	2x
42	7	3	4	35	1:11.3	.75:1
135	68	58	10	67	1:19.7	1:5.8
75	43	26	17	32	1:5.3	1:1.53
52	25	21	4	27	1:6.6	1:5.25
410	282	195	87	128	1:16.4	1:2.24
197	120	97	23	77	1:12.5	1:4.22
66	59	52	7	7	1:11.8	1:7.43
					$\bar{x}$ = 1:9.81	$\bar{x}$ 1:4.13

1/ Based on numbers of infested reds and faders compared to numbers of green infested trees. Average R:G is 1:4.13; that is, an average of 4.13 green trees is present for each infested red or fading tree in the sample spot.

Table 2. Summary of ground check data and attack:emergence bark analysis data for Black Warrior District, Bankhead National Forest, September 1979.

*Total No. of Trees	No. Infested Trees			No. Vacated Trees	Attack:Emergence Ratio	Red:Green[1/] Ratio
	Total	Green	Reds & Faders	Total Red & Black Trees		
1,000	700	521	179	300	1:7.5	1:2.91
179	136	120	16	42	1:7.7	1:7.50
105	66	55	11	39	1:4.0	1:5.0
164	136	101	35	28	1:7.1	1:2.89
83	61	40	21	22	1:12.1	1:1.90
1,100	750	558	192	350	1:14.7	1:2.91
100	58	42	16	42	1:19.3	1:2.63
135	68	50	18	67	1:13.0	1:2.78
					$\bar{x}$ = 1:10.7	$\bar{x}$ = 1:3.57

[1/] Based on numbers of infested reds and faders compared to numbers of green infested trees. Average R:G is 1:3.57; that is, an average of 3.57 green trees is present for each infested red or fading tree in the sample spots.

* Two spots were found to be inactive. Total trees in those spots were 29 and 263 respectively.

Volume Protected Determination

Total volume protected as derived from Hedden's spot growth formula was found to be 951 MBF on the Bankhead District and 10,946 MBF on the Black Warrior District.

DISCUSSION AND RECOMMENDATIONS

SPB suppression activities should continue on the two districts of this Forest. A salvage control action will minimize losses and prevent spot growth by removing infested material from the forest. Chemical suppression and/or cut-and-leave tactics are recommended only for inaccessible spots or for small spots that cannot be administered any other way. Forest Insect and Disease Management, Pineville, La., should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures. If cut-and-leave is to be used, district personnel should plan a training session with FI&DM before the summer season (the summer is the only time this method is recommended for use). All suppression activity should be done in accordance with the 3400 section, FSM, and the project control plan for the forest.

Predicting future timber mortality is difficult due to the occurrence of overlapping generations of beetles each year. The attack:emergence technique used for this evaluation predicts a mortality trend. This prediction technique has been proven accurate on a spot basis, but work continues to adapt these predictions to an area basis. For purposes of this evaluation, assumptions are that spot sizes and distribution within each age class of timber will remain the same.

While direct suppression activities are necessary, it is also possible to reduce future losses through preventative measures. Maintaining healthy, thrifty stands is one of the better ways to prevent SPB losses. Prevention of future losses by both districts can come about by making an effort each year to identify problem areas (FI&DM will aid in this), and treat them silviculturally to either remove or lessen SPB hazard on a stand by stand basis. Here are stand conditions the prescriptionist should look for to reduce SPB losses:

1. Avoid basal areas in excess of 120 sq ft/ac. Older, dense stands should be thinned as heavily as R-8 guides allow.

2. Make sure species is matched to site.

3. Note presence of littleaf or annosus root rot sites. These sites have been shown to be problem SPB areas.

4. Plan for as little disturbance as possible when these stands are thinned. Damaged stands are more susceptible to bark beetle attack.

A vigorous SPB population capable of causing increased losses in FY 80 is present on both the Bankhead and Black Warrior Districts. It is important that suppression action be taken to minmize timber loss and to stop spot growth in the larger spots. Because of expected SPB activity, the forest needs to plan enough technician time to implement the work required to meet project objectives.

For further information, contact Forest Insect and Disease Management, Pineville Field Office, Pineville, La., 71360 (Telephone FTS 497-3311, or Commercial 318-445-6511, Ext. 311).